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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,547	07/10/2003	Lawrence R. Plotkin	10010828-1	4281

22879 7590 01/11/2008

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EXAMINER
ECHELMEYER, ALIX ELIZABETH

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
01/11/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/617,547	PLOTKIN, LAWRENCE R.	
	Examiner	Art Unit	
	Alix Elizabeth Echelmeyer	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18,27-50 and 73-94* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18,27-50 and 73-94* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/ are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response

1. This Office Action is in response to the amendment filed October 22, 2007. Claims 1-18, 27-50 and 73-93 are pending and are rejected for the reasons given below.

Claim Objections

2. The claims are objected to because claim 94, which was added in the amendment filed May 8, 2007, has been omitted in the listing of the claims filed October 22, 2007. There is no statement of claim 94 being cancelled. It appears that Applicants omitted claim 83 in the amendment filed May 8, 2007 and have renumbered claims 84-94 as claims 83-93.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 5-13, 27-32, 35-37, 40, 76, 81 and 93 are rejected under 35 U.S.C. 102(e) as being anticipated by Kindler et al. (US Patent 6,440,594).

Regarding claims 1, 2, 5, 27-29, 40, 48 and 49, Kindler et al. teach a direct oxidation fuel cell system comprising a plurality of anodes, cathodes and electrolyte and a fuel reservoir. The fuel is provided to the anode by an aerosol generator, or fuel ejector, located within the anode chamber of the fuel cell. The fuel is provided as an aerosol of liquid fuel droplets suspended in a gas. The aerosol generator may use one or two fluid nozzles (abstract; Figure 1; column 1 lines 64-67; column 2 lines 1-11).

The amount of fuel delivered to the anode depends on the particular oxidation catalyst used in the anode, the permeability of the membrane, the fuel concentration in the droplets, and the temperature and pressure within the cell. The fuel amount delivered is controlled by a controller, such as a digital or analog computer (column 7 lines 62-67; column 8 lines 1-4).

As for claims 6-9, Kindler et al. teach a tank for methanol that also receives the exhaust from the fuel cell (column lines 26-46). Kindler et al. do not specifically teach that the byproduct would mix with the fresh fuel, but it is the position of the examiner that this mixing would occur inherently, as liquids are known to mix with each other. MPRP 2112.02

Regarding claims 10-13, 76 and 81, Kindler et al. teach a plurality of in situ atomizers or ejectors (column 15 lines 66-67; column 16 lines 1-10).

With regard to claims 30, 32, 36 and 37, Kindler et al. teach a recovery tank within the fuel cell system in addition to the tank for fresh fuel (Ref. 19 of Figure 1; column lines 26-46).

With regard to claim 31, Kindler et al. teach bottled oxygen for the cathode side of the fuel cell reaction (column 5 lines 51-54; reference 26 in Figure 1).

As for claims 35, Kindler et al. teach a sensor for monitoring the functions of the fuel cell. The input from the sensors is used to control the fuel delivered to the fuel cell (column 7 lines 61-67; column 8 lines 1-4).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 4, 33, 34, 38, 39, 43, 44, 46, 48-50, 86 and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey et al. (US 2002/0172851).

The teachings of Kindler et al. as discussed above are incorporated herein.

Kindler et al. teach removing a byproduct of the reaction to be returned to the cell (Figure 1), and that the fuel delivered to the electrochemical cell is provided in a stoichiometric relationship appropriate for the function of the electrochemical reaction (column 10 lines 13-32).

Kindler et al. teach that water is contained in the methanol delivered to the anode (column 6 lines 13-20) and that water produced in the fuel cell is removed from the cathode to prevent flooding (column 16 lines 32-40).

Kindler et al. further teach that water is added to the fuel stream to reduce fuel crossover, but state that too much water in the fuel can cause flooding and degrade cell performance (column 1 lines 46-52). One of ordinary skill in the art would recognize that discovering the optimum amount of water to add to the fuel, which can be considered a stoichiometric amount, is necessary to ensure proper function of the fuel cell. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. MPEP 2144.05 (II B)

Regarding claim 46, Kindler et al. teach the ratio of byproduct to fuel may be controlled by the amount of fuel delivered to the fuel cell. Since the controller of Kindler et al. monitors the cell output or power, Kindler et al. teach a plurality of in situ atomizers or ejectors (column 15 lines 66-67; column 16 lines 1-10) it can monitor the amount of fuel being consumed. By controlling the fuel delivered to the fuel cell, it would inherently control the amount of unreacted fuel byproduct (column 7 lines 62-67; column 8 lines 1-4).

As for claim 47, Kindler et al. teach a tank for methanol that also receives the exhaust from the fuel cell (column lines 26-46). Kindler et al. do not specifically teach that the byproduct would mix with the fresh fuel, but it is the position of the examiner that this mixing would occur inherently, as liquids are known to mix with each other. MPEP 2112.02.

With further regard to claim 50, Kindler et al. teach a recovery tank within the fuel cell system in addition to the tank for fresh fuel (Ref. 19 of Figure 1; column lines 26-46).

With regard to claims 86 and 91, Kindler et al. teach a plurality of in situ atomizers or ejectors (column 15 lines 66-67; column 16 lines 1-10).

Kindler et al. fail to teach that the water produced in the fuel cell is provided to the inlet stream.

Corey et al. teach a water management system for a fuel cell. The system includes removing water from the cathode and providing it in the anode supply ([0078]).

It would be desirable to use the teaching of Corey et al. to remove excess water at the cathode and provide it to the anode supply, since the anode supply of Kindler et al. already includes water, and it would reduce the amount of waste provided by the fuel cell as well as reduce the amount of resources (i.e. water) consumed in the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to take water removed at the cathode and provide it to the anode supply, as taught by Corey et al., in the fuel cell of Kindler et al., since it would reduce the amount of waste provided by the fuel cell as well as reduce the amount of resources (i.e. water) consumed in the fuel cell.

7. Claims 14-18, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Takahashi (US Patent 5,746,985).

The teachings of Kindler as discussed above are incorporated herein.

Kindler et al. teach the electronically controllable drop ejection device of the instant invention but fail to teach a resistor coated with a catalytic material.

Takahashi teaches a heating resistor, excellent in heat transmission, inside a fuel-reforming device. The resistor is further embedded in a catalyst, which allows heat to be transmitted to the catalyst more efficiently, causing the reaction to start more rapidly (column 2 lines 63-67; column 3 lines 1-6).

It is taught by Takahashi that using a resistor embedded in a catalyst is desirable since it is more efficient and causes the reaction to occur more rapidly than the system of Kindler et al.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the fuel-mixing chamber of Kindler et al. with the resistor embedded in a catalyst of Takahashi in order to make a more efficient system in which the reaction of the fuel occurs more rapidly.

8. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey as applied to claim 44 above, and further in view of Takahashi et al.

The teachings of Kindler et al., Corey et al. and Takahashi et al. as discussed above are incorporated herein.

Kindler et al. in view of Corey et al. teach the electronically controllable drop ejection device of the instant invention but fail to teach a resistor coated with a catalytic material.

Takahashi teaches a heating resistor, excellent in heat transmission, inside a fuel-reforming device. The resistor is further embedded in a catalyst, which allows heat to be transmitted to the catalyst more efficiently, causing the reaction to start more rapidly (column 2 lines 63-67; column 3 lines 1-6).

It is taught by Takahashi that using a resistor embedded in a catalyst is desirable since it is more efficient and causes the reaction to occur more rapidly than the system of Kindler et al. in view of Corey et al.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the fuel-mixing chamber of Kindler et al. in view of Corey et al. with the resistor embedded in a catalyst of Takahashi in order to make a more efficient system in which the reaction of the fuel occurs more rapidly.

9. Claims 73-75 and 78-80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. as applied to claims 1 and 27 above, and further in view of Scheifler et al. (US Patent 6,372,483).

Kindler et al. teach a drop ejection device for providing fuel to an electrochemical cell but fail to teach that the device is an inkjet, thermal or piezoelectric drop ejection device.

Scheifler et al. teach dispensing fluids, and further teach that inkjet ejectors, such as thermal or piezoelectric ejectors are commonly used to dispense droplets of fluids (column 3 lines 37-56).

It would be advantageous to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

10. Claims 83-85 and 88-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey et al. as applied to claims 43 and 48 above, and further in view of Scheifler et al.

The teachings of Kindler et al., Corey et al. and Scheifler et al. as discussed above are incorporated herein.

Kindler et al. in view of Corey et al. teach a drop ejection device for providing fuel to an electrochemical cell but fail to teach that the device is an inkjet, thermal or piezoelectric drop ejection device.

Scheifler et al. teach dispensing fluids, and further teach that inkjet ejectors, such as thermal or piezoelectric ejectors are commonly used to dispense droplets of fluids (column 3 lines 37-56).

It would be advantageous to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. in view of Corey et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use any of an inkjet, thermal or piezoelectric drop ejection device in the fuel cell system of Kindler et al. in view of Corey et al. that, as taught by Scheifler et al., are all commonly used to dispense droplets of fluid, since this variety of possible ejectors leads one to have a variety of options of ejectors to assemble the fuel cells depending on which ejectors are available or less costly.

11. Claims 77 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. as applied to claims 1 and 27 above, and further in view of Fan et al. (US 2003/0044666) and Lee et al. (US 5,789,585).

The teachings of Kindler et al. as discussed above are incorporated herein.

Kindler et al. fail to teach a stainless steel anode and transition metal cathode.

Fan et al. teach a foam stainless steel anode for an electrochemical device, stating that it is an effective methanol diffuser ([0019]).

It would be desirable to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. since it functions as a methanol diffuser, which would help to diffuse the fuel of Kindler et al. in the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. since it is a methanol diffuser.

Lee et al. teach a transition metal oxide cathode (column 6 lines 57-58).

Lee et al. further teach that the transition metal oxide cathode maintains electrical conductivity.

It would have been desirable to use the cathode of Lee et al. in the fuel cell of Kindler et al. since it maintains electrical conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cathode of Lee et al. in the fuel cell of Kindler et al. since it maintains electrical conductivity.

12. Claims 87 and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al. in view of Corey et al. as applied to claims 43 and 48 above, and further in view of Fan et al. and Lee et al.

The teachings of Kindler et al., Corey et al., Fan et al. and Lee et al. as discussed above are incorporated herein.

Kindler et al. in view of Corey et al. fail to teach a stainless steel anode and transition metal cathode.

Fan et al. teach a foam stainless steel anode for an electrochemical device, stating that it is an effective methanol diffuser ([0019]).

It would be desirable to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. since it functions as a methanol diffuser, which would help to diffuse the fuel of Kindler et al. in the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the stainless steel anode of Fan et al. in the fuel cell of Kindler et al. in view of Corey et al. since it is a methanol diffuser.

Lee et al. teach a transition metal oxide cathode (column 6 lines 57-58).

Lee et al. further teach that the transition metal oxide cathode maintains electrical conductivity.

It would have been desirable to use the cathode of Lee et al. in the fuel cell of Kindler et al. in view of Corey et al. since it maintains electrical conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cathode of Lee et al. in the fuel cell of Kindler et al. in view of Corey et al. since it maintains electrical conductivity.

Response to Arguments

13. Applicant's arguments filed October 22, 2007 have been fully considered and they are partially persuasive.

Applicant's arguments concerning the aerosol of Kindler et al. and the jetting device of the instant application are not convincing.

It is unclear to the examiner how an aerosol is not a "measured stream of liquid droplets." The aerosol exits a nozzle, making it a measured amount: no more than the amount than can pass through the nozzle does pass through the nozzle, thus that amount is measured. The aerosol is a stream: it is an unbroken flow. When a user of an aerosol can dispenses the contents of the can, as long as the user is depressing the nozzle to allow the contents to exit, the stream is unbroken. The stream is a "jet" based on the provided definition: it is forceful, since force is required for the substance dispensed to be projected from the nozzle instead of dribbling down the can, and it is discharged from a narrow opening.

Applicant argues that an aerosol is different from a jetted stream of liquid droplets because it is a suspension of fine solid or *liquid* particles in a gas. The examiner believes that liquid particles can be considered liquid droplets. Just because the aerosol is a "suspension" does not mean that it does not contain liquid droplets. Thus, the aerosol of Kindler et al. reads on the instant claims.

Further, an operator of an aerosol can will recognize that the aerosol stream is "directed" at a particular target: cooking spray is directed at a pan, insect repellent is

directed at the skin, hairspray is directed at the head. The representation by Applicant of an aerosol suggests that as soon as the contents of the can exit the can they are dispersed haphazardly. The examiner does not agree with such a representation.

Applicant's arguments concerning the byproduct "produced" in the cell are convincing. A new rejection, see above, has been made.

Applicant appears, on pages 23-24, to argue that the admixer and jetting device cannot be interpreted to perform the same function. Two interpretations of Kindler et al. can be made. First, the jetting device can very well be considered the admixer. The examiner does not understand why it cannot be considered an admixer if it performs a mixing function. Second, the methanol tank of Kindler et al. can be considered an admixer, since water and methanol are soluble in one another and would inherently mix in the tank.

As for the arguments concerning claim 8, as discussed above, the aerosol of Kindler et al. provides a liquid stream. The arguments concerning claim 10 have been addressed: Kindler et al. teaches drop ejection devices for delivering an admixture to the fuel cell.

Regarding claim 31, the methanol chamber of Kindler et al. is considered to be the "first fluid storage container" because it contains "at least one chemical component capable of undergoing oxidative reaction" (i.e. methanol). In the instant specification, it is disclosed that fuel is the component "capable of undergoing oxidative" reaction" (p.

12). The "second fluid storage container" contains oxygen, which is "complementary to the oxidative process."

Applicant next argues the rejection over Takahashi (pages 25-26). The arguments are not found to be convincing. Applicants argue that the heating resistor of Takahashi is taught in a reforming reactor, and not a drop ejection device.

The instant invention claims a resistor in a catalyst, and that the catalyst is reactive with a component in the chemical in the oxidative reaction. By reacting the oxidant chemical with a resistor covered in a catalyst, a reforming reaction occurs. Thus, the jetting device of the instant invention becomes a reforming reactor.

The arguments concerning the Scheifler et al. reference are not convincing. The jetting devices of Scheifler et al. and the jetting device of Kindler et al. are considered to be analogous art because, as discussed above, both produce streams of liquid.

The arguments concerning the Bushman et al. reference are convincing. A new rejection of claims 77, 82, 88 and 93 is provided, see above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner
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